



Features

- Self-powered subwoofer
- New digital filters for optimum performance
- Rugged, Baltic birch plywood enclosure
- Extremely high output-to-weight ratio
- Configured for use with the NT Series full-range loudspeakers

Description

The NT Series are self-powered, loudspeakers. Designed for the demands of professional use, they can be the main PA or stage monitors in both portable and installed applications, including: theatres, corporate AV, clubs, houses of worship, schools, auditoriums, and band gigs.

Powerful, field-replaceable, amplifier modules use proven, high efficiency technology. Adding only 9 lb per loudspeaker, these dependable amplifiers not only provide lots of power, their design affords superior sonic performance.

The NTS22 subwoofer is engineered as a companion for the NT full-range loudspeakers, extending low frequency response and output capabilities. The subwoofer's integral and fixed low pass filter provides an optimized, acoustic crossover between the full-range and subwoofer.

The "clam shell" arrangement of the NTS22's two, advanced design, drivers provides tighter coupling to increase output and maximize LF "punch". The push-pull configuration, with one driver facing rearward into the enclosure, means each cone "loads" the other in the opposite direction to smooth out any mechanical asymmetries in piston action that can occur at higher output levels. The result is significantly reduced distortion. A massive port radiates the considerable energy needed at the enclosure's tuning frequency to complement the output of the NT full-range loudspeakers.

NT's mechanical performance received equal attention, including many weight-saving design elements, while maintaining the traditional, rugged, dependability of EAW loudspeakers.

Six year loudspeaker warranty. Two year electronics warranty.



DUAL 12 INCH SELF-POWERED SUBWOOFER

See **NOTES TABULAR DATA** for details

CONFIGURATION

| Subsystem | Transducer | Loading |
|-----------|--|-------------------|
| SUB | 2x 12 in, 4 in voice coil cone driver with neodymium Orbital Magnet Array™ | Vented, Push-Pull |

| Operating Mode | Amplifier Channels | Signal Processing |
|----------------|--------------------|--------------------|
| Dual-amplified | LF1, LF2 | DSP w/1-way filter |

ACOUSTICAL PERFORMANCE ¹

| | |
|-------------------|-----------------|
| Operating Range | 34 Hz to 135 Hz |
| Nominal Beamwidth | |
| Horz | 360° |
| Vert | 360° |

| Axial Output Limit (whole space SPL) | Average | Peak |
|--------------------------------------|---------|--------|
| Calculated LF1, LF2 | 126 dB | 132 dB |

ELECTRICAL PERFORMANCE

| | | |
|-------|-------------|--|
| Input | Type | Electronically balanced |
| | Sensitivity | 4.4 V rms / 15 dBu at Limit 6.2 V rms / 18 dBu at Clip |
| | Impedance | 20 k ohm (balanced to chassis), 10k ohm (unbalanced) |
| | Wiring | Pin 1: chassis, Pin 2: signal +, Pin 3: signal - |

| | | |
|-----------------------------|----------|-----------------|
| DSP (50 Mflop 32 bit Sharc) | Encoding | 24 Bit / 48 kHz |
| | Filters | Proprietary |
| | Latency | 2.15 ms |

| | | |
|-------------------------|-------------------|-----------------------|
| Amplifier (Each of two) | Type | Modified Class D |
| | Maximum Output | 63 V, 1000 W @ 4 ohm |
| | THD + noise | <0.3 % |
| | Dynamic Range | >105 dB |
| | Driver Protection | Integral DSP limiting |

| | | |
|--------------------|--------------|------------------------------|
| AC Mains (Nominal) | Connector | Neutrik PowerCon® |
| | | 115 V 230 V |
| | Input | 90 V to 125 V 200 V to 250 V |
| | Frequency | 60 Hz 50 Hz |
| Current: | Idle | 0.25 A 0.15 A |
| | In Rush | 0.8 A 0.5 A |
| | Output Limit | 1.0 A 0.6 A |
| | Fuse Rating | 10 A 6.3 A |

| | | |
|----------|----------|-------------------|
| CONTROLS | Gain | 0 dB / +6 dB |
| | Polarity | Normal / Inverted |

| | | |
|------------------|------------------|-----------------------------|
| INDICATORS (LED) | Limiter Active | Yellow |
| | Clip | Red |
| | Amplifier Status | Green (Normal), Red (Fault) |
| | Signal Present | Green |

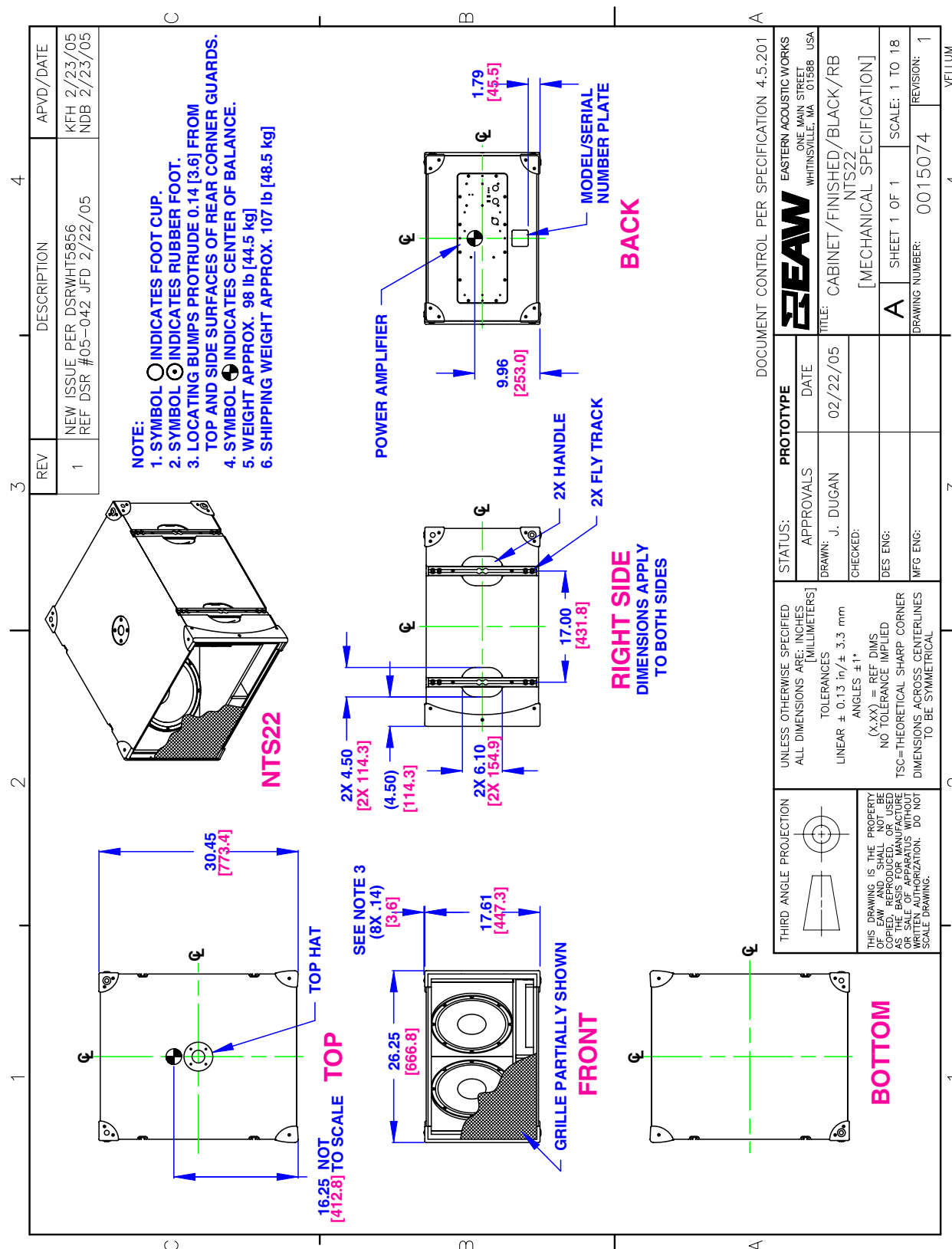
ORDERING DATA

| Description | Part Number |
|--|-------------|
| NTS22 Dual 12 in Subwoofer Black 115 V | 0015262 |
| NTS22 Dual 12 in Subwoofer Black 230 V | 0016290 |
| Optional Accessories | |
| Fly Clip with ring | 0001386 |
| Fly Clip with hook | 179001 |

¹ Specified performance is with the fixed, integral, signal processing. Performance will vary with any external signal processing.

ENCLOSURE

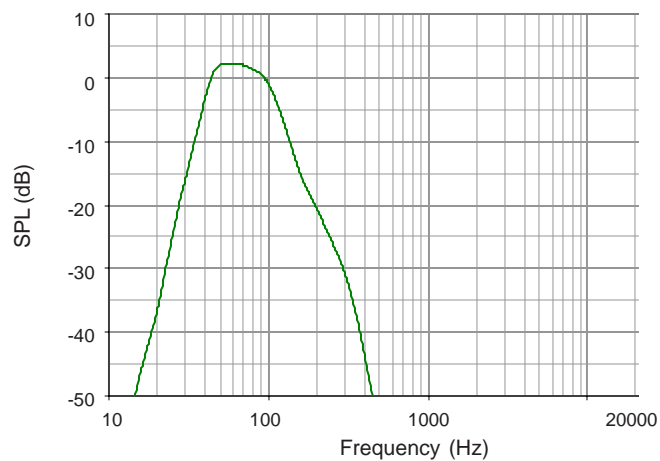
| | |
|----------|-------------------------------------|
| Material | Baltic birch plywood |
| Finish | Wear resistant textured black paint |
| Grille | Powder-coated perforated steel |



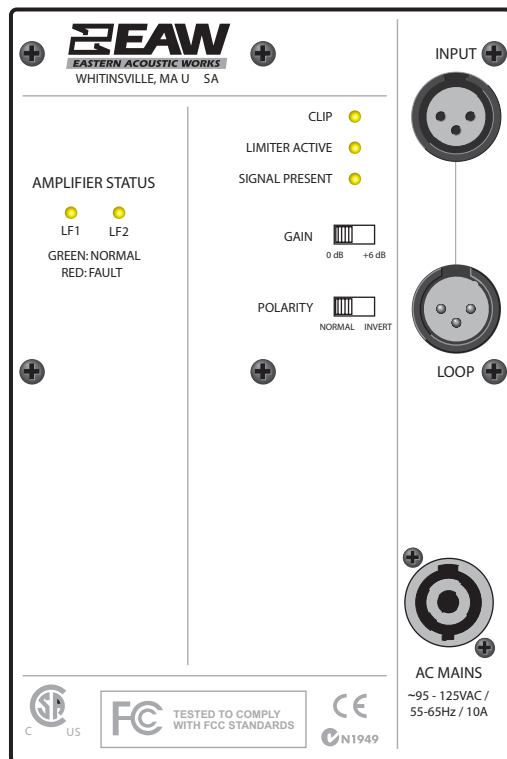
NOTE: This drawing has been reduced. Do not scale.

PERFORMANCE DATA*See NOTES GRAPHIC DATA for details***Frequency Response: Processed Dual-amplified**

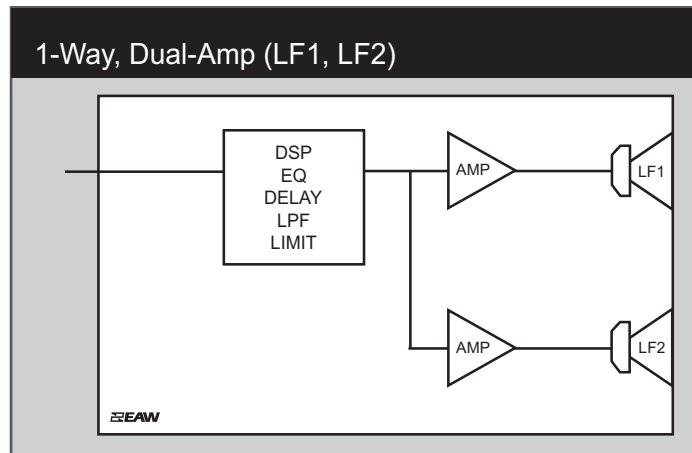
LF1,LF2 = green



INPUT PANEL



SIGNAL DIAGRAM



LEGEND

- DSP/EQ:** Integral Digital Signal Processing.
- HPF:** High Pass Filter for crossover.
- LPF:** Low Pass Filter for crossover.
- LIMIT:** Driver and Electroinic Protection.
- LF/MF/HF:** Low Frequency / Mid Frequency / High Frequency.
- AMP:** Power Amplifier.

NOTES

TABULAR DATA

1. **Measurement/Data Processing Systems:** Primary - FChart: proprietary EAW software; Secondary - Brüel & Kjær 2012.
2. **Microphone Systems:** Earthworks M30; Brüel & Kjær 4133
3. **Measurements:** Dual channel FFT; length: 32 768 samples; sample rate: 48 kHz; logarithmic sine wave sweep.
4. **Measurement System Qualification** (includes all uncertainties): SPL: accuracy +/-0.2 dB @ 1 kHz, precision +/-0.5 dB 20 Hz to 20 kHz, resolution 0.05 dB; Frequency: accuracy +/-1 %, precision +/-0.1 Hz, resolution the larger of 1.5 Hz or 1/48 octave; Time: accuracy +/-10.4 µs, precision +/-0.5 µs, resolution 10.4 µs; Angular: accuracy +/-1°, precision +/-0.5°, resolution 0.5°.
5. **Environment:** Measurements time-widowed and processed to eliminate room effects, approximating an anechoic environment. Data processed as anechoic or fractional space, as noted.
6. **Measurement Distance:** 7.46 m. Acoustic responses represent complex summation of the subsystems at 20 m. SPL is referenced to other distances using the Inverse Square Law.
7. **Volts/Amperes:** Measured rms value of the signal or as noted.
8. **Watts:** Per audio industry practice, "loudspeaker watts" are calculated as voltage squared divided by rated nominal impedance. Thus, these are not True Watt units of energy as defined by International Standard.
9. **SPL:** (Sound Pressure Level) Equivalent to the average level of a signal referenced to 0 dB SPL = 20 microPascals.
10. **Subsystem:** This lists the transducer(s) and their acoustic loading for each passband. Sub = Subwoofer, LF = Low Frequency, MF = Mid Frequency, HF = High Frequency.
11. **Operating Mode:** Between system elements, a comma (,) = separate amplifier channels; a slash (/) = single amplifier channel. DSP = Digital Signal Processor.
12. **Operating Range:** Range where the processed Frequency Response stays within -10 dB SPL of the power averaged SPL within this range; measured on the geometric axis. Narrow band dips are excepted.
13. **Nominal Beamwidth:** Design angle for the -6 dB SPL points, referenced to 0 dB SPL as the highest level.
14. **Measured Axial Output Limit:** SPL for Pink Noise and an average of musical selections at the Limit and Clip thresholds; measured on the geometric axis, referenced to 1 m.
15. **Electrical Performance:** Input, DSP (Digital Signal Processing), amplifier, and ac mains characteristics.
16. **Controls:** Functions that can be adjusted by the operator.
17. **Indicators:** Operating status indicators.

GRAPHIC DATA

1. **Resolution:** To remove insignificant fine details, 1/12 octave cepstral smoothing was applied to acoustic frequency responses and 1/3 octave cepstral smoothing was applied to the beamwidth data. Other graphs are plotted using raw data.
2. **Frequency Response:** Variation in acoustic output level with frequency for a constant input signal. normalized to 0 dB SPL.

NT TECHNOLOGY

NT Design Challenges: The goal for NT loudspeakers was to provide the pristine, transient performance, smooth frequency response, and lack of coloration of direct radiating studio monitors while providing the powerful, high output needed for professional PA applications. This meant horn-loading was required for output capability. However, inherent to horns are two, un-studio-like, but well-known problems: transient smearing or "splashiness" and honk. These problems are caused by internal reflections within the horn and phase plug. Figure 1 shows the spectrogram of an ideal, point-source loudspeaker. Figures 2 and 3 show the spectrograms of an NT loudspeaker optimized with conventional digital signal processing (DSP).

In Figure 2 the spectrogram is set to show some vertical lines in the highest two octaves. These are internal reflections being emitted from the phase plug after the initial signal. These cause splashy-sounding transients, significantly reducing "crispness" and high frequency detail. This also causes transient information to be masked by the reflections from previous signals. Correcting this by phase plug redesign would significantly degrade efficiency, bandwidth, and frequency response flatness.

In Figure 3 the spectrogram is set to show broader, vertical spikes of sound reflecting from the mouth back into, then back out of the horn. The period of these repeated spikes corresponds to the frequency of the prominent, green, horizontal lobe. This lobe shows in-phase summation of the original signal and these subsequent reflections. All this causes the familiar "honk" in horns, the amount varying with a horn's specific geometry and beamwidths. Both transient splashiness and honk problems are sometimes assumed to be non-minimum phase phenomena and uncorrectable. NT proves these assumptions are incorrect.

Gunness Focusing™: Using innovative analysis tools and methods developed by EAW, the specific parameters of these problems were isolated and analyzed as to the solutions using DSP. However, the desired complex filter responses required accuracies grossly lacking in conventional DSP filters based on the Bilinear Z Transform (BZT). These filters sacrifice response accuracies in the upper audible octaves to avoid mathematical difficulties involving the Nyquist frequency. This results in filter response magnitude errors of over 15 dB, with equally flawed phase performance. Using FIR (Finite Impulse Response) filters would have resulted in latencies in excess of acceptability for real time use. Gunness Focusing avoids these issues while employing the the exact, complex, filter responses required.

The results of applying Gunness Focusing to an NT loudspeaker are shown in Figure 4. Both time smear and "honk" are largely gone, making NT's spectrogram look quite similar to the ideal in Figure 1. NT's exceptional frequency and phase responses can be seen in the Performance Data. The change in phase below about 300 Hz simply reflects the overall high pass characteristic of the loudspeaker.

Amplification: NT's amplifiers are designed specifically for real audio signals by using advanced, intelligent, power supply control to provide superior audio quality, extraordinary efficiency, cool operation, and invariance to ac mains disturbances. Circuit protection includes separate power supply and amplifier thermal protection, HF and overall amplifier overload, and a two-state, over-current limiter. The protection circuits are self-resetting, minimizing audio down-time.

Weight: As with any portable loudspeaker, particularly with integral electronics, the engineering challenge was eliminating all possible sources of excess weight without compromising EAW's heritage of exceptionally strong and acoustically inert enclosures. To this end, EAW engineered NT like a finely tuned racecar, where a high efficiency engine, aluminum flywheel, unique chassis design, drilled foot pedals, and the like reduce weight, while maintaining strength, and improving performance. Among NT's weight-saving design elements are: unique joinery to eliminate interior cleats; fly-cutting excess wood, where the full thickness is not needed; removal of unneeded grille railing; structural aluminum fly tracks that also serve as handles; and unique, neodymium, Orbital Magnet Arrays™ to reduce driver magnet weight. The electronic design is so efficient, the entire electronics package (including DSP, heat sinks, connectors, etc.) for the full-range 1500 W power plant, as well as for the 2000 W subwoofer power plant, weighs only 9 lb / 4.1 kg!

The result of this attention to detail is that NT loudspeakers approach the weight of popular, plastic enclosure, self-powered loudspeakers. However, NT loudspeakers provide the robust, physical and acoustical performance of Baltic birch plywood enclosures and a lot more amplifier power.

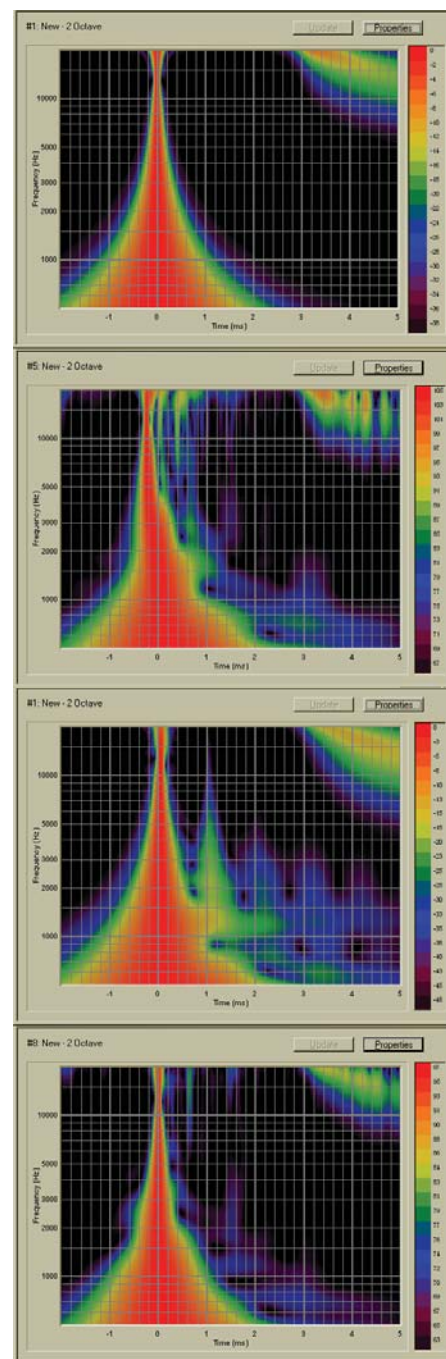
Dependability: NT loudspeakers are bi-amplified, with separate digital processing and amplification for the LF and HF drivers. The processing incorporates sophisticated digital limiting specifically tailored to driver limitations on typical, real audio signals. The limiting is also specifically tailored to minimize reduction in sound quality when operating. This permits very high SPLs with little risk of damaging the drivers.

NT's integral power amplifiers use proven, high efficiency, technology. The DSP settings for all models are stored in the amplifier assemblies, with dip switches to re-configure them for any model. While the likelihood of failure is small, a complete amplifier assembly for any NT full-range model or for the NTS22 subwoofer can be easily replaced in minutes.

NT enclosures have the same Birch plywood construction as used in legendary EAW touring products. No weight-saving modifications impact the ruggedness of this construction. This same mechanical toughness extends to the amplifier design. This means NT loudspeakers are well-equipped to handle the physical rigors of hard, professional use.

Summary: EAW's engineering efforts resulted in the NT Series: robust, compact, lightweight, loudspeakers that provide the pristine, transient performance, smooth frequency response, and lack of coloration of direct radiating, studio monitors. Unlike studio monitors, NT has the exceptional power, output, and directional capabilities as well as the mechanical durability required for professional PA applications.

Figures 1 to 4 (top to bottom)



SPECTROGRAMS: EAW's proprietary spectrograms show the spectrum or frequency content of sound (vertical axis) and its variation in time (horizontal axis), the colors representing intensity. The width of the data reflects the size of the sliding time window applied to the data, which increases in size with lower frequency. The "data" in the upper right is simply a limitation of the spectrograph's mathematics and has no relevance.

